California Council for Environmental and Economic Balance

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July 12, 2007

Ms. Linda S. Adams, Secretary
California Environmental Protection Agency
1001 'I' Street
Sacramento, CA 95814

RE: Green Chemistry Initiative

Dear Secretary Adams:

The California Council for Environmental and Economic Balance (CCEEB) is a non-partisan, non-profit organization of business, labor and community leaders that seeks to achieve the State's environmental goals in a manner consistent with a sound economy. CCEEB appreciates this opportunity to comment and help inform your efforts to develop a Green Chemistry Initiative in California. This letter is meant to convey the initial thoughts of CCEEB as we too begin to work to understand the scope of this undertaking and its relationship to the broad and comprehensive nature of existing federal, state and local statutes and regulations as well as voluntary efforts at green and/or sustainable chemistry that this initiative seeks to improve.

The Green Chemistry Initiative Should Consider Risk Management and Net Benefit

CCEEB believes that an effective green chemistry program should consider the concepts of risk management and net benefit as elemental to identifying topics of focus for this Initiative.

"Risk" is usually expressed as a probability that an event will occur. Expressing risk in this way allows relative comparisons to be made about exposures to various substances and events. For example, expressing risks as a probability allows us to compare a variety of risks associated with daily living as shown in the table below:

RISKS OF DAILY LIVING[1]

Relative Risk	Type of Risk
0.2	Disease from PCBs in diet
0.3	Disease from DDT and DDE in diet
1	Disease from drinking 1 quart of municipal water per day
18	Dying by electrocution in any given year
60	Disease from drinking 12 oz. of diet soda per day (saccharin)
367	Falls, fires, poisonings in the home
667	Respiratory illness caused by air pollution (Eastern U.S.)
800	Dying in auto accident in any given year
2,800	Disease from drinking 12 oz. of beer per day
112,000	Disease from smoking one pack of cigarettes per day

Chemicals are not inherently risky. Rather, risks result from a combination of several factors including a chemicals' potential hazard, potential routes of exposure and dose-response relationships.

An assessment of risk results in an understanding of the level and type of risk associated with a particular substance. Once that risk is understood, steps can be taken to manage it. Risk management efforts can involve a variety of approaches such as:

- Substituting alternative input materials,
- Making process changes during manufacturing,
- Installing technological controls (e.g., pollution control equipment),
- Requiring use of personal protective equipment,
- Instituting a range of pollution prevention options,
- Training,
- Labeling,
- Imposing various storage, transport and disposal requirements,

This is a short list. There are many other regulatory and voluntary efforts to protect workers, the public and the environment. These efforts are embodied in the numerous Federal, state and local statutory and regulatory programs that require a wide range of existing, ongoing and active risk management processes that are already being

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1 Source of Table: Oris, James T. (2004) *Introduction to Environmental Toxicology.* Environmental Toxicology and Risk Assessment, Miami University, http://zoology.muohio.edu/oris/ZOO462/notes/01_462.html
The term "relative risk" is used in a variety of ways, but most commonly it means the risk related to an exposure, characteristic, or habit compared to the risk existing in those without that exposure, characteristic or habit. For example, if the relative risk of injury from falls related to alcohol is 3, it means that people using alcohol are 3 times more likely to be injured in a fall than people who do not use alcohol.

implemented by California's regulated community. Further, industries have undertaken many voluntary risk management efforts at their facilities worldwide.[2]

In addition, risk must be weighed against net benefit. There are many chemicals in use today that could pose a hazard if used improperly but have a net benefit that makes the risk acceptable. Common household cleaners like beaches and detergents are examples of chemicals that could pose a risk if used improperly, but are ubiquitously present in households in California because of their net benefit. Chlorine used to purify drinking water and fluorine added to drinking water by many communities to fortify teeth. Both of these elements are highly toxic in concentrated form and yet serve important community public health functions. Another example of the inherent net benefit of using individually toxic and highly reactive chemicals is the combination of butadiene and styrene to produce latex, a synthetic rubber and a safer paint product. Agencies developing California's Green Chemistry Initiative must realize the importance of applying the concepts of risk management and net benefit in developing and implementing the Green Chemistry Initiative.

The Green Chemistry Initiative Should Consider All Existing Programs That Regulate Toxicity, Risk Management and Reporting

The importance of chemicals and our reliance upon them in our everyday lives has led to myriad programmatic requirements. Today, the chemical industry and industries that use chemicals in production or manufacturing are one of the most heavily regulated industries in the State. These programs take many forms, but can be grouped by those that focus on chemical toxicity, those that manage exposures and risk and those that require extensive reporting. These programs have had great success in reducing or eliminating environmental, occupational and public health risks.

Originally passed in 1986 by California voters, Proposition 65 prohibited contamination of drinking water with chemicals known to the state to cause cancer or reproductive harm. Companies are also required to post public notices of any known potential exposure to a chemical known to the state to cause cancer or reproductive harm. This law has had a fundamental impact in the selection of input chemicals, reuse, recycling and other treatment of waste streams to remove chemicals covered by it to avoid any water discharge and reduce potential exposures.

Since 1987, the California legislature, through AB 2588, has required stationary sources to report the use (both type and amount) of certain chemicals and to undertake a risk assessment of potential offsite risks posed by their use.

In 1989, California enacted the Hazardous Waste Source Reduction and Management Review Act of 1989 (SB 14) in an effort to reduce the generation of hazardous waste and

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2 For example, the Responsible Care program of the International Council of Chemical Associations, the Green Chemistry Institute/American Chemical Society's Twelve Principles of Green Chemistry.

to also prevent the release into the environment of chemical contaminants. Since the enactment of SB 14 California companies have significantly reduced the generation of hazardous waste and eliminated the costs involved in managing those wastes.

In addition to California specific reports, businesses are also required to file reports with various federal agencies. While sometimes similar to those filed with state agencies, more often than not these reports are separate and distinct, and sometimes duplicative, from what is filed with the State. Examples of these reports include the SARA 313 Toxic Release Inventory Determination Report and the Department of Homeland Security Chemical Facility Security.

The following list categorizes some of the various federal and state chemical regulatory and reporting programs, offices and data repositories by their primary emphasis: Toxicity, Exposure and/or Risk. Note that several programs have overlapping jurisdictions, and there are also local programs with additional recordkeeping and reporting requirements. Each of these programs and individual requirements needs to be thoroughly understood and evaluated for significant gaps that need to be addressed to reduce a specific risk. This effort should be completed before any new program or data requirement can be assessed as part of this Initiative.

Toxicity

Toxics Substance Control Act
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
Hazardous Material Release Reporting and Response Plans
Hazard Communication (OSHA)
Pesticide Contamination Prevention Act
National Institute for Occupational Safety and Health (NIOSH)
CA DHS – Hazard Evaluation System and Information Service (HESIS)
Office of Environmental Health Hazard Assessment (OEHHA)
Consumer Product Safety Act
Endangered Species Act - Biological Opinions and Jeopardy Assessments
National Institutes of Health National Library of Medicine Databases

Exposure

Toxics Substance Control Act
Pollution Prevention Act of 1990
Emergency Planning and Community Right to Know Act of 1986
Hazardous Materials Release Response Plans and Inventory
Hazardous Material Release Reporting, Inventory and Response Plans
Air Toxics "Hot Spots" Emissions and Assessment
Office of Environmental Health Hazard Assessment
Federal Insecticide, Fungicide and Rodenticide Act
Hazard Communication
Resource Conservation and Recovery Act

National Institute for Occupational Safety and Health (NIOSH)
Hazardous Waste Source Reduction and Management Review Act of 1989 (SB 14)
Pesticide Contamination Prevention Act
CA Hazardous Waste Management Regulations
CA DHS – Hazard Evaluation System and Information Service (HESIS)
Safe Drinking Water and Toxic Enforcement Act (Prop 65)
Office of Environmental Health Hazard Assessment (OEHHA)
Federal and State Clean Air Acts
Clean Water Act
Porter-Cologne Act
Federal Safe Drinking Water Act
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
Food, Drug and Cosmetics Act
Federal and State OSHA's – Worker Safety Standards
Site Mitigation and Brownfields Reuse Program Database
Unidocs Hazardous Materials Online Inventory Project
OSHA Integrated Management and Information System
CDC National Occupational Exposure Survey
Endangered Species Act – Biological Opinions and Jeopardy Assessments
National Environmental Policy Act
California Environmental Quality Act
National Institutes of Health National Library of Medicine Databases

Risk Identification and Management

Toxics Substances Control Act
Pollution Prevention Act of 1990
Emergency Planning and Community Right-to-Know Act of 1986
Air Toxic "Hot Spots" Emissions and Assessment
Federal Insecticide, Fungicide and Rodenticide Act
Pesticide Contamination Prevention Act
Hazardous Materials Release Response Plans and Inventory
Hazardous Material Release Reporting, Inventory, and response Plans
Hazardous Communication
Resource Conservation and Recovery Act (RCRA)
Hazardous Waste Source Reduction and Management Review Act of 1989 (SB 14)
Nat'l Institute for Occupational Safety and Health (NIOSH)
CA DHS – Hazard Evaluation System and Information Service (HESIS)
Office of Environmental Health Hazard Assessment (OEHHA)
Safe Drinking Water and Toxic Enforcement Act (Prop 65)
Federal and State Clean Air Acts
Clean Water Act
Porter-Cologne Act
Federal Safe Drinking Water Act
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)

Food, Drug and Cosmetics Act
Federal and State OSHA's – Worker Safety Standards
Site Mitigation and Brownfields Reuse Program Database
Unidocs Hazardous Materials Online Inventory Project
OSHA Integrated Management and Information System
CDC National Occupational Exposure Survey
Endangered Species Act – Biological Opinions and Jeopardy Assessments
National Environmental Policy Act
California Environmental Quality Act
National Institutes of Health National Library of Medicine Databases

As each of these specific program elements and specific data requirements is evaluated for purpose and benefit, a shorter list can be compiled of specific program elements that should be examined more closely. Additionally, gaps in programs that could lead to exposures that could give rise to unacceptable levels of risk should also be noted. The objective of this review is to focus further efforts on those topics where risks are not now managed at an acceptable level. CCEEB believes that this can be an effective exercise if its focus is on the identification of programs that are not working effectively to achieve their original purpose or to identify gaps in program and data coverage. CCEEB urges the Agency to avoid suggesting the collection of data for data sake and to avoid recommending new programs that may be in place elsewhere that are not reflective of California's already robust regulatory program.

The Green Chemistry Initiative Should Consider Voluntary Programs and the Concepts of Sustainable Chemistry

Government has not been the sole repository of efforts to promote green chemistry. The Green Chemistry Institute (GCI) was incorporated in 1997 as a not-for-profit entity to promote and advance green chemistry. In January 2001, GCI joined the American Chemical Society (ACS) in an increased effort to address global issues at the intersection of chemistry and the environment. The twelve recognized principles of green chemistry are as follows:

The Twelve Principles of Green Chemistry

1. It is better to prevent waste than to treat or clean up waste after it is formed.

2. Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.

3. Wherever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment.

4. Chemical products should be designed to preserve efficacy of function while reducing toxicity.

5. The use of auxiliary substances (e.g. solvents, separation agents, etc.) should be made unnecessary whenever possible and, innocuous when used.

6. Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure.

7. A raw material feedstock should be renewable rather than depleting whenever technically and economically practical.

8. Unnecessary derivatization (blocking group, protection/deprotection, temporary modification of physical/chemical processes) should be avoided whenever possible.

9. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.

10. Chemical products should be designed so that at the end of their function they do not persist in the environment and break down into innocuous degradation products.

11. Analytical methodologies need to be further developed to allow for real-time in-process monitoring and control prior to the formation of hazardous substances.

12. Substances and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions, and fires.

The terms sustainable chemistry and green chemistry/engineering may be viewed by some as interchangeable. Green chemistry is often defined by the twelve principles of green chemistry developed by Anastas and Warner (referenced above). Equally important to the chemical industry are the principles of Green Engineering developed by Anastas and Zimmerman, which highlight the need for processes developed under the principles to be economically feasible. Sustainable chemistry builds upon the principles of green chemistry and engineering by going a step further and integrating economic viability and social benefits.

Sustainable chemistry focuses on the end application or service delivered comparing all of the potential options (materials and processes) across the full life-cycle, and not just the process to make a particular chemical substance as with green chemistry and engineering. This requires a much longer term view (decades) than is common today. Also, those products which meet important needs of society are clearly more beneficial from a sustainable chemistry perspective. For example, using plastic to provide water pipe that delivers safe drinking water is more beneficial to society than providing hula hoops.

Sustainable chemistry is not only about maximizing efficiency, minimizing risk, and reducing environmental impact, analogous to green chemistry and engineering, it's also about ensuring social benefit and economic viability for the applications and services delivered across the full life cycle of those products. Sustainable chemistry is not an endpoint, but a journey of continuous improvement, that can bring tremendous benefits to society if done well.

These voluntary programs should be reviewed to see if some of the mechanisms they employ might have a place in the Green Chemistry Initiative. Clearly voluntary efforts are underway to advance both Green Chemistry and/or Sustainable Chemistry. DTSC

may be able to replicate some of the valuable lessons learned in these programs, including adoption of incentives that best motivate greater use of Green and Sustainable Chemistry.

The Green Chemistry Initiative Should Consider the Impact Domestic Product Liability and Other Consumer Protection Law Has On The Introduction and Use of Chemicals in Commerce in California

Another significant restraint on the use of chemicals in the stream of commerce in the United States is product liability and other consumer protection laws. As product liability law has evolved over time in the United States, the doctrine of *caveat emptor*, meaning "let the buyer beware" has been replaced in the consumer sector with strict liability, warranty and other consumer laws. A product placed in the stream of commerce likely has at least an implied warranty that using it correctly will not result in harm to the consumer. This liability places a responsibility upon manufacturers to insure that the products they produce do not contain chemicals in a state that will result in harm. In effect this concern over potential liability creates a "self-policing" mechanism that is not in place in other parts of the world.

Product liability and other consumer protection laws alone are not enough to ensure that all consumer products are always safe, making recalls sometimes necessary. However, the overlay of U.S. product liability law should not be ignored when comparing the effectiveness of U.S. chemical regulatory programs with programs in other parts of the world (most notably the E.U.) that do not have robust product liability laws.

This body of law also raises a question of the extent to which a governmental entity might share in any potential civil liability were it to participate in or actually make a decision regarding an input chemical or process change; for example, if that decision were to be identified as a reason for product failure. This discussion is not intended as a legal analysis as much as a suggestion that the existence of product liability law and other consumer laws in California are intended to influence corporate decisions and behavior and as such, should be considered as part of the Green Chemistry Initiative.

Conclusion

In conclusion, CCEEB applauds your effort to identify ways that California can improve how we use and manage chemicals and create potential exposures that may give rise to an unacceptable risk that is not now managed as effectively as it should. We should always be looking for opportunities to reduce, reuse and recycle in ways that foster a cradle-to-cradle approach. California's corporate community should also actively consider the pollution prevention hierarchy established in 1989 with the adoption of SB 14 that establishes input substitution as the first inquiry in reviewing steps to reduce hazardous waste.

CCEEB believes that the most appropriate starting point for the Green Chemistry Initiative is to thoroughly review the numerous Federal, State and local laws that regulate toxicity, exposure and risk management relating to chemicals as well as reporting

requirements. Though The Special Report, "Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation," by Wilson Chia and Ehlers reviewed several State and Federal laws, the review was not comprehensive and rigorous enough to establish to provide the basis to recommend whole new programs. A thorough review will allow the Initiative to better focus its inquiry on programs that are not performing as they should and identify potential programmatic gaps. Data gaps should also be considered if the information is needed to allow another needed program to function better.

Finally, before seriously considering use of the new EU program as a model, DTSC should recognize the unique and important role played by product liability law in the U.S., and influence this body of law has on corporate decision-making. In addition, DTSC should understand how that body of law could create potential consequences for government bodies that approve or inhibit chemical uses in certain products. Further, the Initiative should thoroughly consider and incorporate the concepts of risk management and net benefit as they operate through the existing regulatory and voluntary programs implemented by a wide range of agencies and organizations nationwide.

Thank you for this opportunity for initial comment. If you would like to discuss these issues further, please contact Robert Lucas at 916-444-7337 or Jerry Secundy at 415-512-7890.

Sincerely,

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Climate Change Project Manager

Gerald D. Secundy
President

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